THE ANNUAL REPORT

OF THE

DYKING COMMISSIONER

•FOR THE YEAR ENDING DEC. 31, 2002•

SUBMITTED TO:

The Hon. **Steve Ashton**
Minister
Conservation

SUBMITTED BY:

R. Hay P. Eng.
Dyking Commissioner

103-06116/

THE ANNUAL REPORT

OF THE

DYKING COMMISSIONER

FOR THE YEAR ENDING

DECEMBER 31, 2002

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1 Acknowledgements

Evaluation of the adequacy of the dyking system is based mainly on reports provided by the staff of the City of Winnipeg and the University of Manitoba. Their cooperation in providing annual reports and technical advice is gratefully acknowledged.

2 The Dyking Authority Act of 1952

The Dyking Authority Act D110, passed in 1952, was intended to ensure that the dykes and pumping stations constructed subsequent to the 1950 flood were maintained in a state of readiness to combat future floods. In fact, the full title of the original Act was *An Act to Provide for the Maintenance of Dykes and Pumping Stations in Greater Winnipeg.*

While authority and control over dykes and pumping stations was vested with the city or rural municipality in which they were situated, provision was made for the appointment of a Dyking Commissioner with powers to inspect dykes and pumping stations and to order work to be undertaken to maintain an integrated system of flood defence as well as to establish the location of the line of defence.

The Dyking Commissioner is required to "before the first day of April in each year, make to the Minister a report on the administration and carrying out of the provisions of this Act during the year ending on the thirty-first day of December next preceding the making of the report, and on the condition of the dykes, pumping stations, and pumps, and their sufficiency for the purposes for which they were constructed or installed."

3 Changes Since 1952

Several major changes have taken place since the passing of The Act in 1952.

1. Major flood control projects affecting river water surface levels in the City of Winnipeg have been completed, namely, the Red River Floodway in 1968, the Assiniboine River - Portage Diversion and Shellmouth Dam in the early 1970's.

2. Urban development has taken place beyond the lines of flood defence previously established.

3. The five cities and two rural municipalities subject to The Act have been replaced by a single city.

4. Under the Canada-Manitoba Flood Damage Reduction Agreement, Interim Flood Risk Maps designating Flood Risk Areas and Floodways in the City of Winnipeg were produced in 1980 and flood protection criteria for developments dictated by flood levels were defined.

5. The City of Winnipeg Act was amended in 1981 to recognize the designated flood risk areas and to establish revised criteria for development in flood prone areas.

6. As of January 1, 1992 the Designated Floodway Fringe Area Regulation 266/91 requires the Primary Dyke to be located, designed and constructed to the standard and elevation approved by the City Administrator and the Dyking Commissioner .

4 Current Issues and Actions

Changes to legislation and the dynamics of urban development give rise to issues from time to time. Issues currently being addressed include:

1. Flood defence lines continually requiring revisions to accommodate the effect of flood control/protection works and the impact of on-going urban development.

   The City is continuing to review the Primary Line of Defence (PLD) for re-designation and extensions. Plans are prepared and submitted to the Dyking Commissioner for approval. Proposals have been reviewed with the Commissioner as noted in the City of Winnipeg report in Appendix D. The City has completed digital mapping of the 115 kms of primary dykes and has prepared a comprehensive set of drawings/plans. This database is to be incorporated within the City's new Flood Protection System -Operation and Maintenance Manual.

2. Since the 1997 "Flood of the Century", a number of initiatives have been undertaken with respect to enhancing the level of flood protection for the City. All have implications for future administration of The Dyking Authority Act.

   i) The International Joint Commission (IJC) initiated comprehensive studies of the City's flood defence systems that identified vulnerabilities and proposed strategies for flood risk reduction. The final report, entitled " Living with the Red", was issued in December of 2000. The Report contained several conclusions of which the following perhaps bears most significantly on the future of the Primary Dyking System in Winnipeg: "Under flow conditions similar to those experienced in 1997, the risk of a failure of Winnipeg's flood protection infrastructure is high. Public safety requires that the city, province and Canadian federal governments focus immediate attention on designing and implementing measures to further protect Winnipeg."

   - In November of 2001, KGS Group, a Winnipeg based engineering consulting firm, released a report entitled " Flood Protection Studies for Winnipeg ". The report concentrated on extension of preliminary analyses for the two options considered, at the time, the only viable means of significantly enhancing the level of flood protection for the City and surrounding area. As of December of 2002, the Government of Manitoba had committed to the favoured option, that being a $ 660 M expansion of the existing Red River Floodway. The proposal would entail reconstructing the floodway channel and its appurtenant structures to a standard that would effectively provide the City of Winnipeg protection against a 1:700 year design flood event.

The IJC also endorsed several recommendations of its own task force, specifically,

-Recommendation #7- "The Primary Dyking system for Winnipeg should be raised where economically feasible to the elevation specified in existing legislation."
There remain several locations within the City where the designated primary line of defence is slightly below the Flood Protection Level for short distances. The City has identified these reaches for permanent upgrading as programming allows. The proposed Floodway Expansion Project includes these upgrades.

-Recommendation #10- "Modifications to the sewer and land drainage systems of Winnipeg should be optimised and undertaken once the overall plan for Winnipeg flood protection is determined."
The City has identified and scheduled the required works for future infrastructure plans. There are several components of this work that can be implemented at any time. They are independent of the overall design standard to be selected for enhancing the level of flood protection for the City.

-Recommendation #11- "The City should give immediate high priority to the preparation of a detailed emergency preparedness and response manual".
Work is nearing completion on the comprehensive Flood Activity/ Emergency Operations Manual for the City's flood protection infrastructure. The operating features of the manual were to be tested during the anticipated 2002 spring flood, but extraordinarily low run-off conditions failed to produce sufficient river flow to generate the required river levels.

ii) The City entered into an agreement with both the federal and provincial governments to provide enhanced secondary flood protection works (i.e. on the river side of the Primary Line of Defence). The agreement, whose term has been extended to March 31, 2005, provides a total of $11.1 M for upgrades to both individual property site flood protection and community secondary ring dykes within the City Limits. The Dyking Commissioner is a member of the Technical Advisory Committee that co-ordinates the implementation of the agreement, as several of the proposed works lie within the designated Floodway Fringe of the Red River. As of December 2002, several individual residence projects and several condominium and community ring dyke projects were completed. The construction of an improved secondary dyke around the Elm Park Peninsula for the residents of Kingston Row/Crescent and an improved permanent secondary dyke for the residents of Kilkenny Drive North were both 95% completed.

iii) Further to a recommendation from the Manitoba Water Commission-June 1998 Report, the Province presided over a committee established to review the operating rules for the Red River Floodway. The ad hoc Floodway Operation Review Committee (FORC) was comprised of representatives from Manitoba Water Resources Branch, the Federal government (PFRA), the City of Winnipeg and the Rural Municipal Councils of the three municipalities immediately upstream of the Floodway Inlet. The Committee's final report was entered on the public registry in 2001 and the report's recommendations received federal government ratification. In 2002, the Government of Manitoba committed to a further review of the operating rules for the Floodway, in anticipation of a requirement pursuant to Environmental Licensing for the proposed Floodway Expansion project. There was no need to convene the annual Red River Floodway Operation Advisory Board to oversee the determination of the Inlet Structure gate settings for the spring runoff of 2002.

5 Inspection of Facilities

The City of Winnipeg and the University of Manitoba have ongoing inspection and maintenance programs. The programs for 2002 are described in detail in the reports under Appendix D.

Recognition is hereby acknowledged that the City and University apply appropriate levels of care to the maintenance of their respective flood protection facilities.

6 Reports by the City of Winnipeg and the University of Manitoba

A questionnaire was sent to the City and to the University requesting information for the purpose of preparing this report. A copy of the request and questionnaire is included in Appendix C. The replies to the questionnaire, included in Appendix D, indicate that regular monitoring, detailed inspections and necessary maintenance work was carried out.

7 Primary Dyking System Report

1. Pumping Stations and Gates

Operational activities coincident with spring run-off flow conditions were not required in 2002. Instead, extremely high precipitation on the upper basin in early June produced abnormally elevated summer flows on the Red River, which reached the City around June 11, 2002. This required the activation of several gates and pumping stations from June 11 to late July as described in the attached Appendix 'D'.

Normal annual maintenance activities were undertaken on the pumping stations and gate chambers in 2002. The City's Water and Waste Department continued to upgrade the lift station alarm and monitoring systems, and both the flap style and positive gate configurations at the automated stations.

The University of Manitoba noted repairs to the No. 5 sewer outfall pipe would be completed prior to spring run-off.

The specific details of these programs are outlined in the attached Appendix D.

2. Primary Line of Defence

Operation: No dyke closures or dyke raising operations were required in 2002 with respect to the primary dykes. Operations were confined to normal gate closures and sewer pumping. Despite the unprecedented summer operation of the Floodway, the "Forks" river walkway was inundated for much of June and virtually all of July due to the excessive summer precipitation.

Administration: Updated drawings are included in Appendix B indicating the most recent authorized revisions to the Primary Line of Defence within the City of Winnipeg.

8 Additional Works Constructed

Works in the vicinity of the Provencher bridge, ie. the re-alignment of Water and Pioneer Avenues, were undertaken in 2002. Planning and construction continues for which modifications to the Primary Line of Defence are incorporated, namely, Waterfront Drive and the new Provencher Bridge and its adjacent pedestrian bridge.

9 Recommendations

It is recommended the City of Winnipeg continue its efforts to complete all necessary rehabilitation and upgrading to the primary dikes, pump stations, gates and outfalls through the primary dike, to improve the integrity of the system. The proposed $ 660 M Floodway Expansion project includes an estimated $ 110 M in expenditures related to upgrading various components of the Primary Dyking system.

It is recommended the City of Winnipeg, with the assistance of the Dyking Commissioner, ensure that permanent modifications to the secondary dykes do not detrimentally impact the Designated Floodway of the Red River channel, the primary dykes or local drainage outlets.

10 Appendix A

City of Winnipeg
List of Flood Pumping Stations and Gate Chambers

CITY OF WINNIPEG FLOOD CONTROL FACILITIES - 2002

PERMANENT FLOOD PUMPING STATIONS:

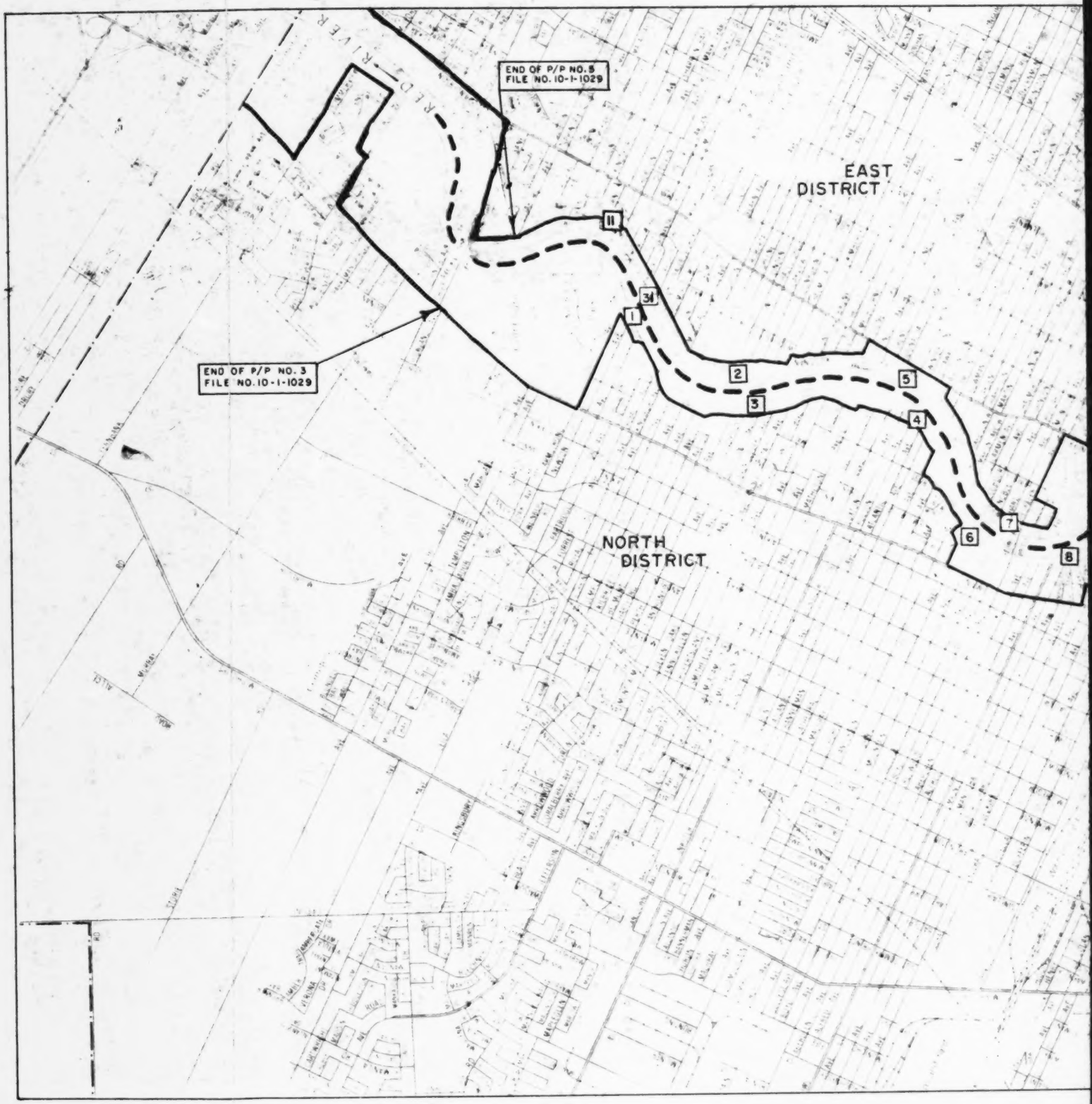
1 Newton
2 Linden
3 Jefferson
4 Polson
5 Monroe
6 St. John
7 Hart
8 Selkirk
9 Syndicate
10 Archibald Underpass
11 Hawthorne
12 Galt
13 Bannatyne
14 Assiniboine
15 Colony
16 Cornish
17 Aubrey
18 Clifton
19 Mission
20 Laverendrye
21 Dumoulin
22 Despins
23 Mayfair
24 Ash
25 Marion
26 Jessie
27 Metcalf
28 Baltimore
29 Mager Drive
30 Cockburn
31 Larchdale
32 Turnbull Drive
33 St. James Underpass
34 Roland

GATE CHAMBERS:

Rainbow Stage
St. Mary's Road
Armstrong
Ft. Rouge Park
Maryland
Renfrew
St. Norbert X-Kalay
Eccles (new 1200mm SRS)
Wildwood Golf Course
X-Kalay Drive Culvert
Darcy @ Glengarry
Crane @ Southdrive (WWS)
Kilkenny N. of Radcliffe
N.E. Interceptor
Ruby
Pembina & Crane
Aubrey (Storm)
Kingston Row CSO
Trappiste @ Pembina
Assiniboine E.
Assiniboine W.
Burrows
Calrossie @ Riverside
Ducharme @ Villineuve
Eccles (old 750mm SRS)
Kilkenny & Rice
Lombard
McDermot
Spence
Somerset @ Riverside
Bredin Drive
Canora
Guay
Churchill Drive Underpass
Churchill High School
Bredin Drive
Chataway
Deer Lodge Place
Douglas Park
Ferry Road
Kildonan Park
Lemay & Lord
Olive Street
Conway
Cranestorm
Donald Street
Dowker Outfall
Osborne @ St. Vital Bridge G.C.
Hargrave Street
Inkster
Kennedy
Kingston Row Underpass
Riviera Crescent Outfall
Water Avenue
Clarence & Hamlin
Colony
Dieppe
Hawthorne
Parkside 30"
Parkville
Sommerville & Beaumont
St. Boniface Hospital MH
Kildare
Riverdale
McLeod Cr. & Kildonan Cor.
Donacaster
Dunham Road
Plaza Drive
Pulberry
Seel & Fennel
Darcy 43 m N. of Glengarry
Glasgow
Summerview Lane
South St. Vital Ret. Basin
N. St. Boniface LDS
Shier Drive
Barker
Waverley Lakes
Arlington
Calrossie Outfall
Conway
Moore
Strathmillan
Wexford
Killarney
Rowandale
Ridgedale
River Point Pl.
Clifton Overflow (Omands Cr.)
Forks
Heritage
N.E. Interceptor Manhole
King Edward Storm
Kingston Row @ Elm Park
Riverbend 90"
Tylehurst
Lot 16 Gate
Fermor

11 Appendix B

City of Winnipeg Maps - Showing District Boundaries,
Flood Defence Lines and Pumping Station Locations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NORTH
DISTRICT
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EAST
DISTRICT

NORTH
DISTRICT

OF P/P NO. 3
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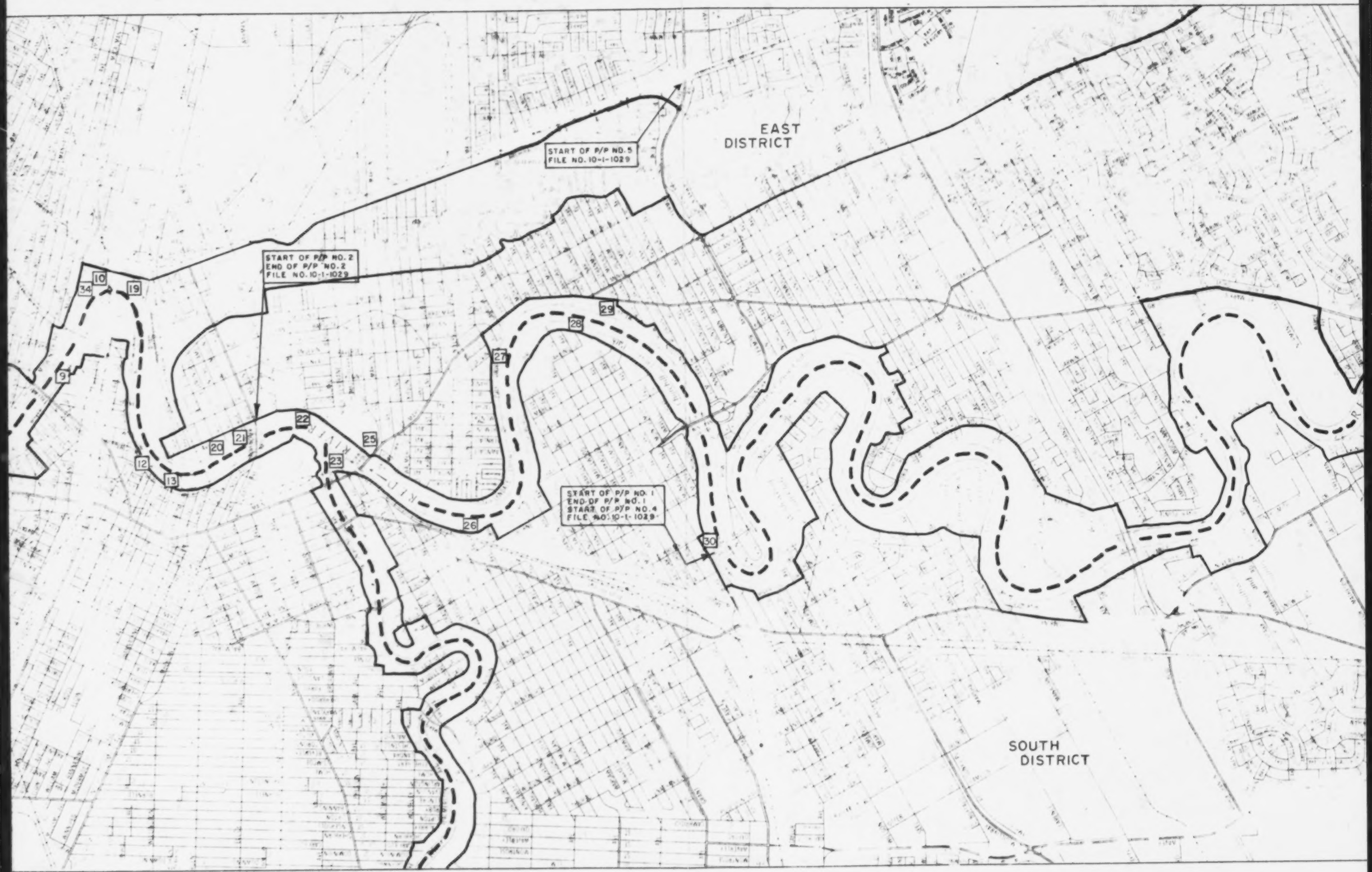
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SOUTH
DISTRICT
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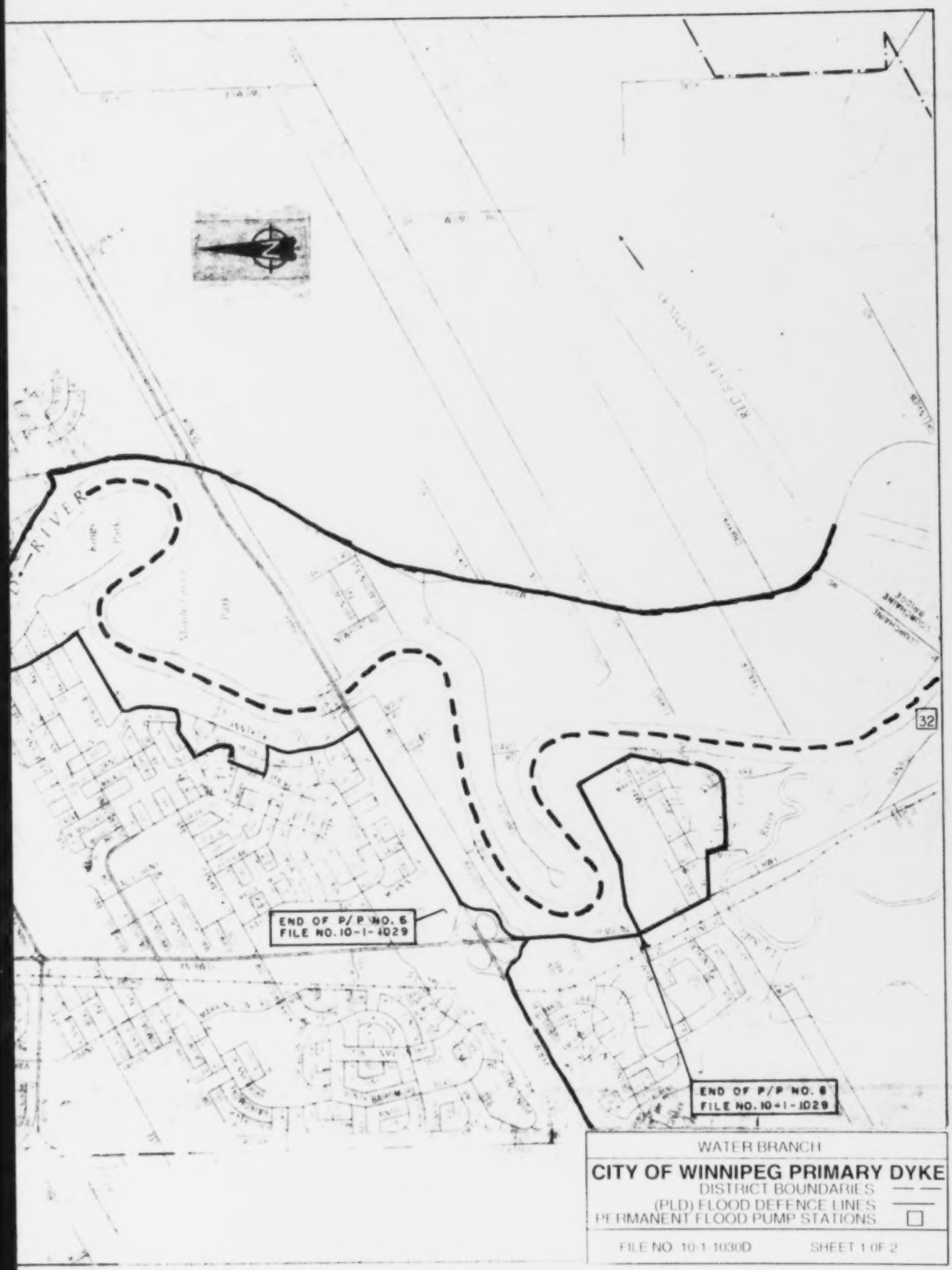


WATER BRANCH

CITY OF WINNIPEG PRIMARY DYKE

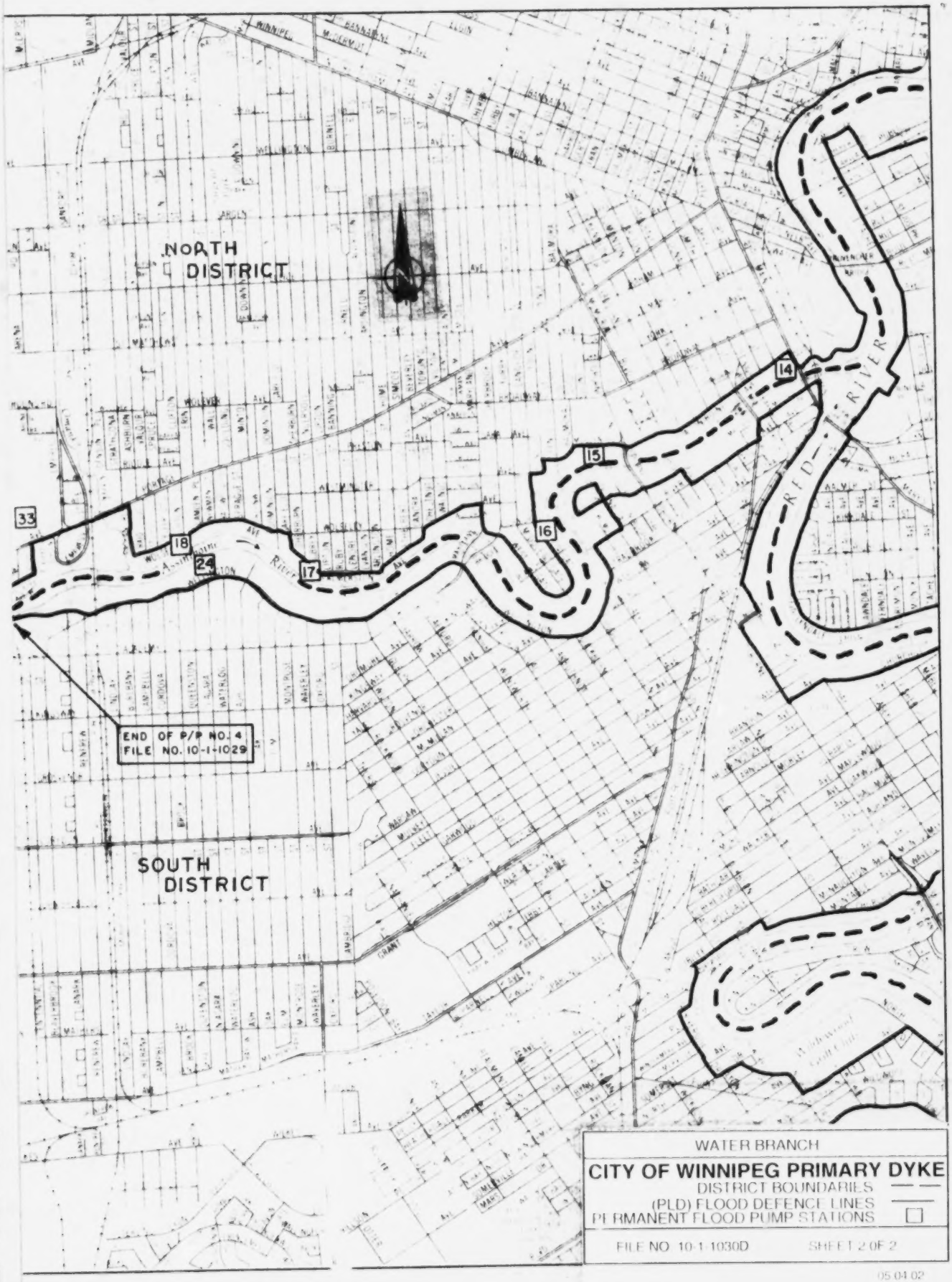
DISTRICT BOUNDARIES — —

(PLD) FLOOD DEFENCE LINES ——

PERMANENT FLOOD PUMP STATIONS □

FILE NO. 10-1-1030D SHEET 1 OF 2

05.04.02



WATER BRANCH

CITY OF WINNIPEG PRIMARY DYKE

DISTRICT BOUNDARIES — —

(PLD) FLOOD DEFENCE LINES ——

PERMANENT FLOOD PUMP STATIONS □

FILE NO. 10-1-1030D SHEET 2 OF 2

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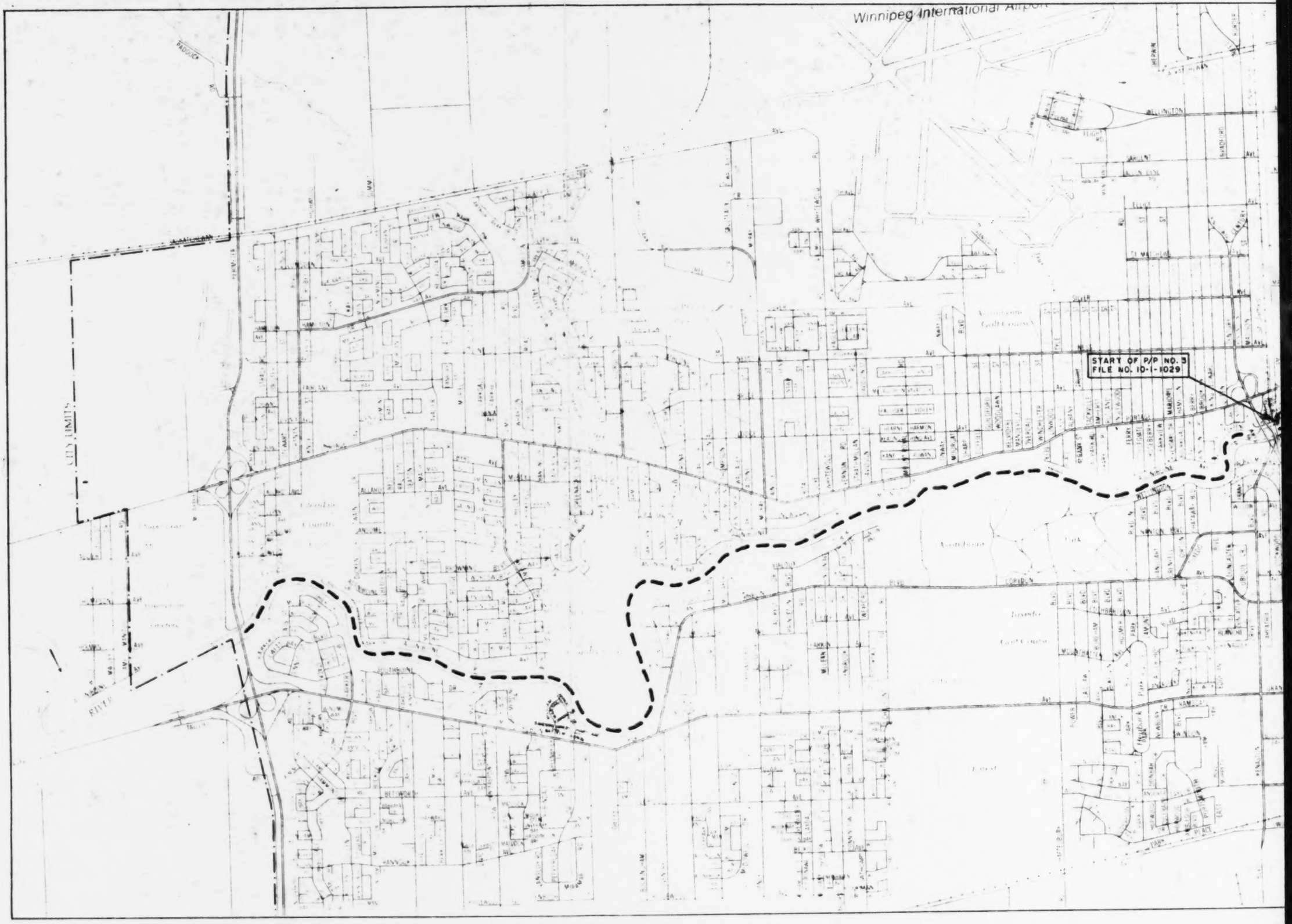
Winnipeg International Airport
CITY LIMITS
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12 Appendix C

Copy of Questionnaire to:

The City of Winnipeg
and
The University of Manitoba

Manitoba

Conservation

Water Branch
Box 19 – 200 Saulteaux Crescent
WINNIPEG MB R3J 3W3
Phone: (204)945-6496
Fax: (204)945-7419

December 9, 2002

File: 11.1.5

Mr. Barry McBride
Director, Water & Waste Department
The City of Winnipeg
101 – 1155 Pacific Avenue
WINNIPEG MB R3E 3P1

Dear Mr. McBride:

RE: Dyking Commissioner's 2002 Annual Report

The Dyking Authority Act, Section 15, requires that:

> "The commissioner shall, before the first day of April in each year, make to the minister a report on the administration and carrying out of the provisions of this Act during the year ending on the thirty-first day of December next preceding the making of the report, and on the condition of the dykes, pumping stations, and pumps, and their sufficiency for the purposes for which they were constructed or installed."

To assist in making this report I request that you supply me with a report on the dyking system and pumping stations under your jurisdiction for the 2002 calendar year **by March 1, 2003**. Please provide your report in the same format as was utilized last year.

Yours truly,

Rick Hay, P. Eng.
Dyking Commissioner

cc: Steven D. Topping, Director
Water Branch

Enclosure
RIAH/jb

Manitoba

Conservation

Water Branch
Box 19 – 200 Saulteaux Crescent
WINNIPEG MB R3J 3W3
Phone: (204)945-6496
Fax: (204)945-7419

December 9, 2002

File: 11.1.5

Ms. Debbie McCallum
Associate Vice-President
Ancillary & Physical Resources
208 Administration Building
University of Manitoba
WINNIPEG MB R3T 2N2

Dear Ms. McCallum:

RE: Dyking Commissioner's 2002 Annual Report

The Dyking Authority Act, Section 15, requires that:

> "The commissioner shall, before the first day of April in each year, make to the minister a report on the administration and carrying out of the provisions of this Act during the year ending on the thirty-first day of December next preceding the making of the report, and on the condition of the dykes, pumping stations, and pumps, and their sufficiency for the purposes for which they were constructed or installed."

To assist in making this report I request that you supply me with a report on the dyking system and pumping stations under your jurisdiction for the 2002 calendar year **by March 1, 2003**. Please provide your report in the same format as was utilized last year.

Yours truly,

Rick Hay, P. Eng.
Dyking Commissioner

cc: Steven D. Topping, Director
Water Branch

Enclosure
RIAH/jb

QUESTIONNAIRE FOR THE ANNUAL REPORT ON THE PRIMARY DYKING SYSTEM WITHIN THE CITY OF WINNIPEG

1. For the Reporting Year:

Please provide information concerning:

a) Difficulties and problems encountered.

b) Maintenance and repairs carried out.

c) New Sewer Outfall Gate Structures constructed.

d) Improvements and modifications carried out.

2. Proposed Plans for Future

Please provide information concerning proposed new structures, modifications to existing structures, and proposed improvements or additions to the dyking system. Also note any evaluation studies completed or underway in connection with the "Primary Dyking System".

Further, in view of the apparent river bank stability problems, please provide information in regard to:

a) Evaluation of river bank stability in critical areas.

b) Monitoring erosion of river banks in critical areas.

c) Any remedial works undertaken or completed in the reporting year.

3. Availability and Location of Proposed Borrow Pits

Indicate changes, if any, in availability and location of proposed borrow pits in the reporting year.

13 Appendix D

Replies to Questionnaire

UNIVERSITY OF MANITOBA

PHYSICAL PLANT

89 Freedman Crescent
Winnipeg, Manitoba
Canada, R3T 2N2

FAX: (204) 474-7547

January 28, 2003

Mr. Rick Hay, P. Eng.
Dyking Commissioner
Water Resources Branch
Box 19 - 200 Sauteaux Crescent
Winnipeg, Manitoba
R3J 3W3

Dear Mr. Hay:

Subject: **Dyking Commissioner's 2002 Annual Report**

The following is in response to the questionnaire for the Annual Report on the Primary Dyking Systems within the City of Winnipeg.

1. **2002 Calendar Year**

a) Difficulties and problems encountered.

The discharge pipe from Outfall #5 has broken apart. Repairs to be complete before spring run-off.

b) Maintenance and repairs carried out.

None.

c) New Sewer Outfall Gate Structures constructed.

None.

d) Improvements and modifications carried out.

None

2. **Proposed Plans for Future**

There are no further plans for new structures or modifications at this time.

a) Evaluation of river bank stability in critical areas.

There are no evaluation studies underway or planned at this time.

b) Monitoring erosion of river banks in critical areas.

Monitoring of riverbanks is conducted regularly at 13 river bank locations. There was no significant erosion detected during 2002.

Pins were missing at site 5 on the South Bank.

c) Any remedial works undertaken or completed in the reporting year.

None.

3. **Availability and Location of Proposed Borrow Pits.**

No changes are suggested in the availability or location of proposed borrow pit for 2003.

Yours truly,

Brian J. Rivers
Director of Physical Plant

bjr/nl

cc: Mr. M. McAdam, Vice-President (Administration)
Mrs. D. McCallum, Associate Vice-President (Administration)

SOUTH BANK

SITE	DESCRIPTION	FALL '98	FALL '99	FALL'00	FALL '01	FALL '02	FALL '03
1.1	SW of building corner	74' 11"	74' 11"	75' .5"	75' 4"	75' 4"	
1.2	S of hydro pole	40' 1"	40' 1.5"	40' 3"	40' 4"	40 ' 6.5"	
2.3	SW of Waterworks	73' 8.5"	73' 8.5"	73' 8.5"	73' 8"	73' 8.5"	
2.4	S of hydro pole	49' 5.5"	49' 5.5"	49' 8"	49' 8"	49' 8"	
3.5	S of parking meter E Drake	116' 7"	116' 6.5"	116' 6.5"	116' 8"	116' 9"	
3.6	SE of hydro pole	33' 8.5"	33' 8"	33' 8"	33' 8"	33' 8"	
4.7	SW of hydro pole	39' 4"	39' 4.5"	39' 4"	39' 4"	39' 4.5"	
4.8	S of light standard	71' 7"	71' 9"	71' 8"	71' 9"	71' 9"	
5.9	S of light standard	68' 2"	68' 4"	68' 2.5"	68' 3.5"	New pins installed	
5.10	SW of oak tree	49' 8"	49' 8"	49' 6.5"	50' 2"	in spring.	
6.11	SW of light standard	49' 11.5"	50'	50' .5"	50' .5"	50' 1"	
6.12	SE of hydro pole	51' 11"	51' 9"	51' 9"	51' 9"	51' 9 "	
7.13	Corner of Core Shed	32' 9.5"	32' 8"	32' 9"	32' 7"	32' 8"	
7.14	Post of parking fence	16' 6"	16' 5.5"	16' 5.5"	16' 4.5"	16' 5"	

NORTH BANK

SITE	DESCRIPTION	FALL '98	FALL '99	FALL'00	FALL '01	FALL '02	FALL '03
1.1	N of culvert	48' 3/5"	48' 3.5"	48' 1"	48' 1"	48' 1"	
1.2	N of light standard	73' 9.5"	73' 9.5"	73' 9"	73' 9"	73' 9"	
2.3	N of light standard	115' 1.5"	114' 10"	114' 11"	115' 2"	115' 2.5"	
2.4	NE of Wallace building corner	73' 5.5"	73' 5"	73' 5.5"	73' 5.5"	73' 5.5"	
3.5	NW of Wallace building corner	47' 4.5"	47' 3"	47' 3.5"	47' 3"	47' 3.5"	
3.6	NE of light standard	122' 9.5"	122' 9.5"	122' 9"	122' 8"	122' 9"	
4.7	N of pump house	122' 3"	122' 2.5"	122' 4"	122' 4"	122' 4"	
4.8	NE of Chancellor's Hall	162' .5"	162' 1.5"	162' 4.5"	162' 2.5"	162' 3"	
5.9	N of Castle Sculpture	108' 10"	108' 9"	106' 8"	106' 8"	106' 8"	
5.1	NE of Flood Gates	180' 10.5"	180' 9.5"	180' 10"	180' 9.5"	180' 10"	
6.11	N of light standard	134' 5"	134' 3"	133' 10"	133' 11"	133' 11.5"	
6.12	NE of culvert	126' 7"	126' 5"	126' 6.5"	120' 6" *	120' 6"	

* New Pin

Winnipeg

Water and Waste Department • Service des eaux et des déchets

April 1, 2003 Our File No. 020-08-03-00-00

Manitoba Department of Conservation
Box 19
200 Saulteaux Crescent
Winnipeg, Manitoba
R3J 3W3

ATTENTION: MR. R. HAY, P.ENG., DIKING COMMISSIONER

Dear Mr. Hay:

RE: DIKING COMMISSIONER'S 2002 ANNUAL REPORT

In reply to your letter of December 9, 2002, please find attached the 2002 Flood Activity Report of the Water and Waste Department and the Public Works Department with regard to Flood Pumping Stations and the Diking System within the City of Winnipeg.

Yours truly,

Barry D. MacBride, P.Eng.
Director

/db
Attachment

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1.0 THE CITY OF WINNIPEG FLOOD CONTROL REPORT

The City of Winnipeg, Water and Waste Department is responsible for the Primary Line of Defence (primary diking system) and the flood pumping stations within the City of Winnipeg. The following report summarizes the operations of these facilities for the 2002 calendar year.

Throughout the year, the Water and Waste Department's Collection System crews inspected all flood pumping stations once per week. All stations were checked for temperature, basement flooding and vandalism. All problems were repaired as soon as possible.

Commencing in the month of February, all stations were given a complete maintenance check to ensure that these facilities were ready for operation when required. This annual servicing includes:

i) lubricating and operating all positive gates on sanitary, storm and combined sewers;

ii) inspection of all wet well floats;

iii) lubricating and operating of all pumps and equipment within the station;

iv) inspection of all electrical main boxes, starter boxes and motors;

v) inspection of all high voltage transformers and equipment;

vi) inspection of automated control system, where installed.

The Red River's behaviour in 2002 was highly unusual in that no spring high water event was experienced. Despite this, a later peak occurred during the summer when heavy June rainfalls resulted in elevated river levels in the City of Winnipeg. The Red River reached a peak of 17.3 feet above City datum at James Avenue on June 15th, 2002. The river then receded to normal summer water level by August 5th, 2002. The graph on page 3 illustrates the 2002 high river level events, by plotting daily river levels during the year's high river level period. The table on pages 4 and 5 summarizes the flood activities for 2002. River elevations shown on these tables are in imperial units and are recorded in James Avenue stages.

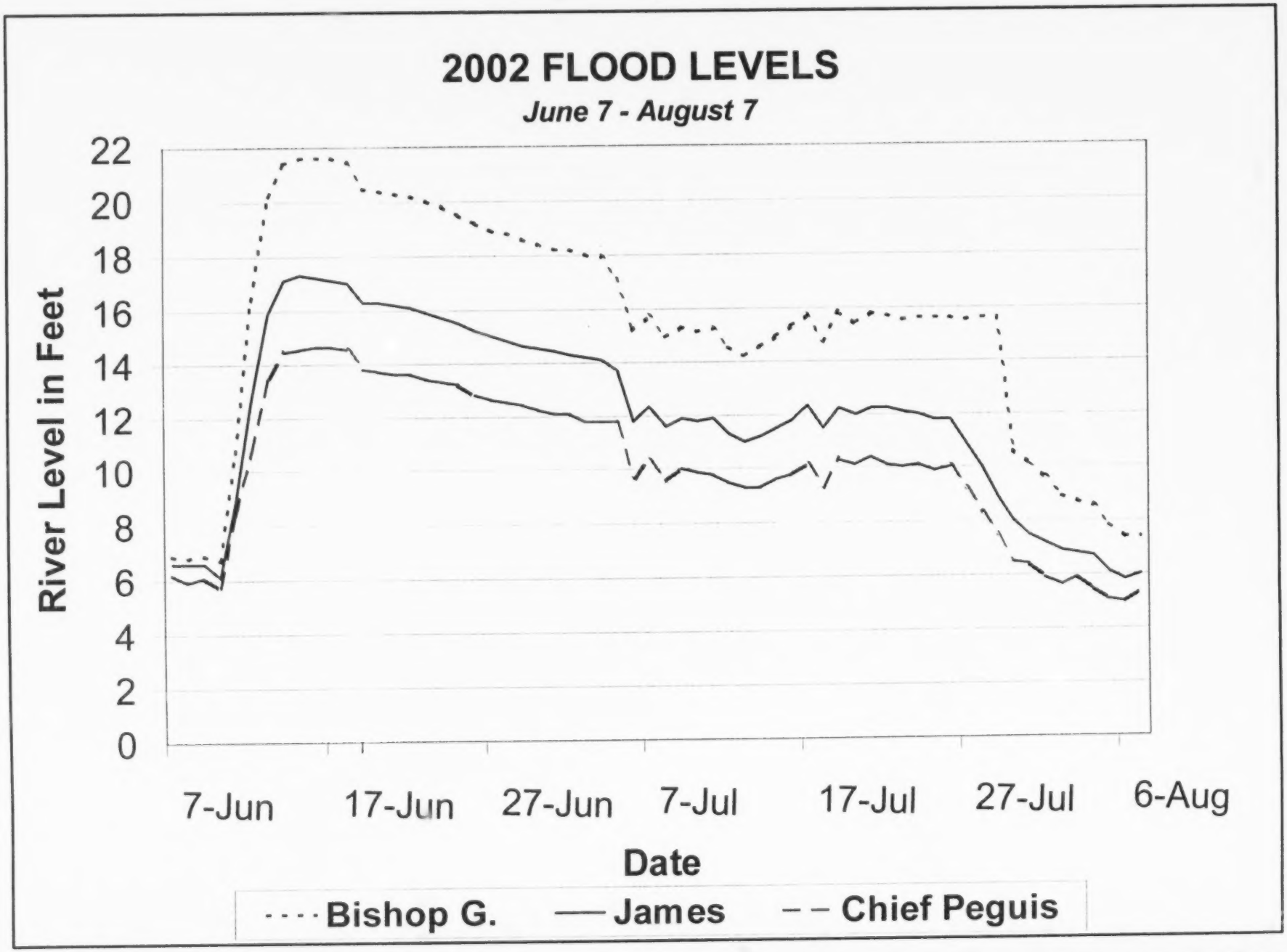
During October all of the flood pumping stations were winterized in conjunction with the routine weekly checks. Thirty (30) of the City's thirty-four flood pumping stations are now

automated. The automated stations all require activation at a level equivalent to or below 20.0 feet at James Avenue Datum. Conversion and expansion of the City's flood activity manual into a digitized electronic format continued in 2002, and real-time monitoring of the Assiniboine River was installed at five locations. The Water and Waste Department is continuing with its program to evaluate and upgrade the configuration of the flap and positive gates at the automated stations.

During the 2002 high water event, river levels were recorded at James Avenue, and the Bishop Grandin (Route 165) and Chief Peguis bridges. Generally, levels are forecast and flood operations proceed on the basis of James Avenue river levels.

Monitoring of some Stormwater Retention Basin levels was undertaken in 2002, specifically in the Whyte Ridge and Bunn's Creek areas. Performance of the Lot 16 Drain and other major channels was excellent in 2002 as no Stormwater Retention Basin drainage difficulties were encountered.

The Water and Waste Department has continued in its efforts to upgrade the information provided in the Flood Control Manual.


2002 FLOOD LEVELS
June 7 - August 7
River Level in Feet
22
20
18
16
14
12
10
8
6
4
2
0
7-Jun
17-Jun
27-Jun
7-Jul
17-Jul
27-Jul
6-Aug
Date
Bishop G.
James
Chief Peguis

THE CITY OF WINNIPEG
WATER & WASTE DEPARTMENT
ANNUAL FLOOD ACTIVITY REPORT
2002

FLOOD PUMPING STATION	GATE CHAMBER	ACTIVATION/GATE CLOSED			DEACTIVATION/GATE OPENED		
		DATE	TIME	RIVER ELEV	DATE	TIME	RIVER ELEV
Marion		02 06 10	23:30	7.7	02 07 31	08:40	7.5
Despins		02 06 11	08:30	9.3	02 07 30	10:00	7.9
	St. Norbert X-Kalay	02 06 13	06:30	15.9	02 08 01	11:45	7.9
	Armstrong Crossover	02 06 11	13:15	10.1	02 07 30	11:00	7.9
Fort Rouge Park		02 06 11	10:30	9.3	02 07 30	09:00	7.9
	Rainbow Stage (South Gate)	02 06 11	09:30	9.3	02 07 30	10:35	7.9
LaVerendrye		02 06 11	13:30	10.6	02 07 29	10:00	8.9
	Aubrey (storm)	02 06 12	16:45	14.1	02 07 30	10:30	7.9
	Ruby	02 06 12	17:30	14.1	02 07 30	12:00	7.9
Jefferson		02 06 12	12:10	13.7	02 07 29	11:30	8.9
Linden		02 06 12	11:45	13.6	02 07 29	12:00	8.9
Metcalfe		02 06 12	10:40	13.4	02 07 29	10:45	8.9
Mager Dr.		02 06 12	11:00	13.6	02 07 29	10:45	8.9
Newton		02 07 12	14:00	13.9	02 07 08	10:30	11.4
Baltimore		02 07 12	14:00	13.9	02 07 08	10:30	11.4
Cockburn		02 07 12	09:20	13.4	02 07 08	11:00	11.7
	Burrows	02 07 12	14:30	14.1	02 07 05	09:30	13.7

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WATER & WASTE DEPARTMENT
ANNUAL FLOOD ACTIVITY REPORT
2002

FLOOD PUMPING STATION	GATE CHAMBER	ACTIVATION/GATE CLOSED			DEACTIVATION/GATE OPENED		
		DATE	TIME	RIVER ELEV	DATE	TIME	RIVER ELEV
	McDermot	02 06 12	15:05	14.3	02 07 05	10:00	13.7
Hart		02 06 12	22:00	14.8	02 07 02	10:30	14.3
Syndicate		02 06 12	21:00	14.9	02 07 02	09:30	14.3
Bannatyne		02 06 12	19:40	14.8	02 07 02	11:00	14.3
Archibald Underpass		02 06 12	22:45	14.8	02 06 27	09:15	14.9
	Rainbow Stage (North Gate Closed)	02 06 13	09:40	15.9	02 07 30	10:35	7.9
	Rainbow Stage (South Gate Opened)	02 06 13	09:40	15.9			
	Bredin Drive (set up pump)	02 06 13	14:55	16.6	02 06 28	10:30	14.7
	Canora	02 06 13	17:30	16.7	02 06 27	12:00	14.9
Galt		02 06 13	13:10	16.2	02 06 26	09:00	15.2
Dumoulin		02 06 13	10:15	16.2	02 06 19	14:00	16.2
	Chataway	02 06 13	12:30	16.3			
	Deer Lodge Place G.C.	02 06 13	13:00	16.3	02 06 17	11:10	17.1
	Douglas Park G.C.	02 06 13	13:30	16.4	02 06 19	09:45	16.4
Polson		02 06 13	13:30	16.4	02 06 24	12:00	15.7

2.0 EXTENSIONS AND REDESIGNATIONS OF THE PRIMARY LINE OF FLOOD DEFENCE

2.1 East Area

2.1.1 Kildonan Drive Dike - On February 13, 1991, the City was granted a dike easement through the lands zoned Park on the Edgewood Estates' property, north of the Bergen cut-off and at the north end of Kildonan Drive. On February 17, 1992, the Diking Commissioner granted approval-in-principle for the designation of lands through Edgewood Estates' property as Primary Line of Flood Defence. Finalization of the easement agreement was pending upon review by the property owner.

During the 1997 Spring Flood event, a permanent earth dike was constructed through the Edgewood Estates' property extending from the Kildonan Drive right-of-way at the south to the existing embankment of the Chief Peguis Trail to the north. In December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per drawings described in Section 3.0.

The Diking Commissioner approved the designation of this section of the primary dike on May 24, 2002.

2.1.2 Evans Street Dike - Land acquisition of private lands along the west Seine River bank is essentially complete. Land acquisition negotiations are on-going for private lands along the east Seine River bank. Once secured, the lands will accommodate relocation of the Seine River at a bend, and stabilization and reconstruction of Evans Street from Gareau Street to Deniset Street for its proposed designation as a Primary Line of Defence. Some 200 dwellings and several sewer overflows will be added to the City's flood protection system through this initiative.

2.1.3 Normand Park Development Dike - The most recent extension of the primary dike along the north limit of the Normand Park Development was completed in December, 1989; and deficiencies were rectified in November, 1992. Certificates were issued for the dikes in the last two of the five developments. In December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per the drawings described in Section 3.0.

The Diking Commissioner granted interim authorization for this section of dike to be utilized as a line of defence on May 24, 2002 until such time as the dike can be raised to FPL with a minimum width of 9.2 m at that elevation.

2.1.4 St. Anne's Road Dike – In December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per the

drawings described in Section 3.0.

The Diking Commissioner approved the designation of this section of the primary dike on May 24, 2002.

2.1.5 St. Mary's Road Dike – In December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per the drawings described in Section 3.0.

The Diking Commissioner approved the designation of this section of the primary dike on May 24, 2002, despite the dike top elevation at some locations being slightly below FPL for short distances.

2.2 North Area

2.2.1 The Forks Development Dike - A leakage test on the chamber was performed and passed on February 21, 1992. Deficiencies regarding modifications to the top of the structure are still outstanding. The Water and Waste Department will be proceeding with application for redesignation of the dike once final acceptance of the gate chamber is issued.

On June 18, 1993, the Water and Waste Department requested approval-in-principle of a dike realignment as a result of a proposed plaza/archaeological dig site at the Forks. On July 21, 1993, the Diking Commissioner granted approval-in-principle for this relocation. The project proceeded as a plaza in 1997 without the archaeological dig site. Therefore, the primary dike alignment was not relocated. Redesignation with this portion of the dike will be part of the whole Forks Development, as above.

2.2.2 Timber Crib Dike – The majority of this dike has been replaced by a new earthen dike, which forms part of the extension of Pioneer Boulevard North of the Provencher Bridge. This work proceeded in late 1998 as part of the construction related to the new baseball facility on the North side of Water Avenue. The Acting Diking Commissioner granted approval for realignment of the Primary Line of Defence on September 14, 1998.

Plans to remove the remaining portion of the Timber Crib Dike and replace it with an earthen dike, were drafted as part of the Provencher Bridge Project.

2.2.3 Dike along former Winnipeg Railway – Plans to relocate the primary dike from Lombard Avenue to Higgins Avenue, were drafted as part of the proposed Waterfront Drive Project. However, the alignment of the dike and the dike top elevation are generally maintained.

2.3 South Area

2.3.1 Plaza Drive and Adamar Road Dikes - Easements have been secured for the dike between Plaza Drive and Bishop Grandin, and for the dike from Adamar Road to Plaza Drive. The Water and Waste Department has surveyed and will be preparing drawings of a portion of Bishop Grandin Boulevard to link the Plaza Drive dike to the D'Arcy Drive dike. In December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per the drawings described in Section 3.0. This includes the dedesignation of those portions of the dike becoming redundant along Pembina Highway, University Crescent, Agassiz Drive and Glengarry Drive.

The Diking Commissioner approved the designation of this section of the primary dike on May 24, 2002.

2.3.2 St. Norbert Daycare Dike - The St. Norbert Daycare proposed the installation of playground equipment on a portion of the primary dike. The Water and Waste Department provided a drawing showing where the new dike is to be realigned to by-pass equipment. Upon completion of all drawings, this Department will proceed with application for redesignation.

2.3.2 St. Norbert School Dike - During the 1997 Spring Flood event, a permanent earth dike was constructed through the Seine River School Division property extending from the existing dike South of the St. Norbert Cemetery at the East to Rue Campeau to the West. In December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per the drawings described in Section 3.0.

The Diking Commissioner did not approve the designation of this section as the primary dike on May 24, 2002, as one section does not meet Flood Protection Level.

2.3.3 St. Norbert Dike - During the 1997 Spring Flood event, the permanent earth dike was raised from the South end of the Lord Avenue right-of-way to the North end of the Rue St. Pierre right-of-way. The St. Norbert dike as well as the St. Norbert Cemetery and Seine River School Division dikes (Section 2.3.2), provides for a continuous length of dike, which will protect in excess of 50 additional properties. December 1999, the Water and Waste Department requested the Diking Commissioner's approval-in-principle for designation of the dike as per the drawings described in Section 3.0.

The Diking Commissioner approved the designation of this section of the primary dike on May 24, 2002.

3.0 PRIMARY LINE OF DEFENCE (PLD) MAPPING

The Water and Waste Department has completed a project initiated in 1986 to produce plan/profile drawings of the City's 115 kilometres of primary dikes. These drawings update the plan/profiles prepared by the Provincial Water Control and Conservation Branch in 1967 in a modern, revisable format. The drawings also identify deficiencies in the diking system, location of manholes, pipes, catch basins, outfalls and control chambers which breach the dike, and areas where the dike must be realigned to keep pace with new development. 119 plan/profile drawings at a scale of 1:2000 have been produced.

The project is divided into 7 drawing series corresponding to the different sides of the Rivers. The Series are described as follows:

- Series 100 contains 16 drawings covering the West side of the Red River from the Forks North to the City limits.
- Series 200 contains 8 drawings covering the North side of the Assiniboine River from St. James Street East to the Forks.
- Series 300 contains 8 drawings covering the South side of the Assiniboine River from Kenaston Boulevard East to the Forks.
- Series 400 contains 28 drawings covering the West side of the Red River from St. Norbert North to the Forks.
- Series 500 contains 26 drawings covering the East side of the Red River from the Floodway North to the junction of the Seine River.
- Series 600 contains 16 drawings covering the West side of the Seine River from the Floodway North to the junction of the Red River.
- Series 700 contains 17 drawings covering the East side of the Seine and Red rivers from the Floodway North to the City limits.

Further to the recommendations of the Manitoba Water Commission Report (June 1998) and the subsequent comments by the Diking Commissioner (1998 Annual Report of the Diking Commissioner – Appendix E), the Water and Waste Department in December 1999, requested the Diking Commissioner's approval-in-principle for many of the proposed extensions/redesignations to the Primary Line of Defence described in Section 2.0. Most of these requests were granted by the Diking Commissioner on May 24, 2002, as described in Section 2.0.

4.0 SECONDARY LINE OF DEFENCE (SLD)

The City of Winnipeg actively planned, prepared for and undertook specific flood protection activities as necessary in response to the high river levels and overland flooding in the Spring of 1997. For the "Flood of the Century," the City protected over 800 properties with temporary secondary dikes, most with 8.1 million sandbags and 50 locations with earthfill (600,000 m^3).

As a result of the Canada-Manitoba-City of Winnipeg Agreement on Secondary Diking Enhancements (November, 1999), $11.1 million has been allocated to undertake three initiatives related to permanent secondary dikes. These are:

1) community ring dike sites feasibility study ($400,000);
2) construction of community ring dikes ($6.3 million), and;
3) construction of flood proofing works at individual sites ($4.4 million).

The Community Ring Dike Sites Feasibility Study was completed in 2001. The first community ring dikes to be completed were the Kingston Crescent/Row project and the Kilkenny Drive North project in late November 2002. Several individual flood proofing projects were completed or underway in 2002.

The City of Winnipeg has also passed a "Secondary Dike By-law" that protects the integrity of existing permanent dikes and establishes a diking corridor at locations where temporary secondary dikes would be required in an emergency. The corridor prevents obstructions, such as decks or garages, which would impede the timely erection of a temporary dike.

5.0 FLOOD ACTIVITY / EMERGENCY MANUAL

The Water and Waste Department has engaged Professional Engineering Services for the preparation of an overall flood activity and emergency manual for the entire City of Winnipeg which will consolidate and update existing information and develop activities for portions of the City where activity manuals do not currently exist.

The intent of this project is to provide a detailed and comprehensive operations Flood Activity / Emergency Manual in an electronic format for all Combined and Separate Sewer Districts within the City of Winnipeg. The manual describes flood activities required at various river stages such as gate monitoring, gate closures, activation of pumping facilities, installation and activation of temporary pumping facilities, raising primary dikes and erecting secondary dikes. This will ensure proper and prompt action by staff to protect properties from overland and basement flooding for a water elevation equivalent to 25.8 feet at James Avenue Datum (the water level corresponding to the legislated Flood Protection Level).

Work on this project has continued throughout 2002 and significant progress has been made. A mock trial run of the Flood Manual was scheduled for January 2003 as well as a trial run for the spring of 2003 flood event. Completion of this project is anticipated to be in the fall of 2003.

6.0 RESPONSES TO DIKING COMMISSIONER'S QUESTIONNAIRE

The following are the responses from the Public Works Department and the Water & Waste Department:

6.1 Engineering Division – Public Works Department.

6.1.1 For the Reporting Year.

a) There were no difficulties or problems encountered.

b) Maintenance and repairs carried out were as follows:

- Replaced the Galt Avenue outfall for the Water and Waste Department from the pump station to the Red River on Waterfront Drive.
- Abandoned the Water Avenue outfall at the old Provencher Bridge.
- Abandoned pipes to Amy Street Steam Plant under Waterfront Drive.

c) There were no new sewer outfall gate structures constructed for the reporting year.

d) Improvements and modifications carried out were as follows:

- Provencher Bridge – At final stages of construction in 2003, riprap erosion will be installed on both banks within the vicinity of the bridge.
- Redwood Bridge – Riverbank monitoring was initialized on the east riverbank and at the east river pier ahead of the proposed 2003 bridge rehabilitation.
- Waterfront Drive – Completed slope stability from May Street to McDermot outfall to increase slope stability to a factor of safety of 1.5. Completed roadway from Lombard Avenue to May Street (now renamed Waterfront Drive). Dike is east of roadway from Lombard Avenue to McDermot Avenue.
- Pioneer Avenue at Provencher Bridge – Deleted plan to build clay dike on the north side of Pioneer Avenue west to Waterfront Drive and north approximately 50 m, will instead tie into wood dike at the new Provencher Bridge.

6.1.2 Proposed Plans for Future.

a) Riverbank monitoring will be initialized on the east bank of the Red River at the Redwood Bridge in 2003 as a supplement to structure movement monitoring.

b) Continue monitoring existing slope indicators on a rotating scheduled basis.

c) Will restore dike on the west bank of the Red River at the new Provencher Bridge.

6.1.3 Riverbank Stability.

a) There was no evaluation of riverbank stability in critical areas.

b) Riverbank erosion is monitored by visual inspection at all river crossings on an annual basis. Erosion was unremarkable in 2002.

c) There were no remedial works undertaken or completed.

6.1.4 Availability and Location of Proposed Borrow Pits.

a) There was no change to the availability and location of proposed borrow pits.

6.2 Engineering Division - Water & Waste Department.

6.2.1 Cathedrale Ave. Outfall – New 1200 mm dia. Outfall installed servicing a LDS into the Red River.

6.2.2 Tache Gate Chamber – installed to FPL and is equipped with both sluice and flap gates.

6.2.3 St. Mary's Overflow – replaced 1400 mm dia. CMP Outfall pipe at 1916 St Mary's Road and stabilized the riverbank.

6.2.4 Bannatyne Outfall – lined existing wood Outfall with a 1050 mm dia. polyethelene liner.

6.2.5 Bredin Drive – abandoned the existing 450 mm dia. Outfall at 310 Bredin Drive and diverted flow to an existing 750 LDS.

6.2.6 Wildwood Outfall – lined the existing 750 mm dia. clay Outfall with a 710 mm dia. polyethelene liner.

6.2.7 St. Charles Outfall – replaced the existing 250 mm dia. asbestos cement Outfall with a 250 mm dia. polyethelene pipe.

6.2.8 Woodhaven Outfall – installed new 750 mm dia. CMP Outfall and riprap on existing sewer.

6.2.9 Arlington Outfall – installed new 375 mm dia. Outfall.

6.2.10 Dumoulin Flood Station – relocated the flap gate upstream of the positive gate.

6.3 Water Services Division - Water & Waste Department.

6.3.1 There were problems encountered with the gate chamber at the intersection of Lemay Avenue and Lord Avenue. The gate was broken and the outfall had to be plugged off until the river levels went down.

6.3.2 The repair(s) carried out on the sewer system to maintain or improve flood protection was the purchase and installation of a new gate for the above location.

6.3.3 There were no construction or upgrading projects on any of the sewer outfall structures.

6.3.4 There were no other modifications made to the sewer system or diking system.